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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,160	04/08/2004	Adrian C. Anderson	ROC920030422US1	9190

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EXAMINER	
SIDDIQUI, SAQIB JAVAID	

ART UNIT	PAPER NUMBER
2138	

DATE MAILED: 05/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/821,160	ANDERSON ET AL.	
	Examiner	Art Unit	
	Saqib J. Siddiqui	2138	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *NPL REFERENCE*.

DETAILED ACTION

Oath/Declaration

The Oath filed April 08, 2004 complies with all the requirements set fort in MPEP 602 and therefore is accepted.

Drawings

The filed drawings are accepted.

Specification

The contents of the filed specification are accepted.

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sarrica et al. (hereinafter Sarrica) enclosed NPL (Theory and Implementation of LSSD Scan Ring & STUMPS Channel Test and Diagnosis), and further in view of Rajski US Pat no. 6,662,327 B1.

As per claim 1:

Sarrica substantially teaches a method for implementing based broken scan chain diagnostics (Figure 5) comprising the steps of: generating a test pattern (Figure 3 "PRPG"); loading the test pattern into each scan chain in a device under test using lateral insertion via system data ports and applying system clocks (page 198, Figure 6); unloading each scan chain and identifying a last switching latch in each scan chain (page 198,column 2); repeating the generating, loading, and unloading testing steps a selected number of times (page 199, column 1); and checking for consistent results (page 199, column 1); and responsive to consistent results being identified, sending the identified last switching latch to a Physical Failure Analysis system (page 198, "Diagnostic software")

Sarrica does not explicitly teach the generation of the test pattern to be deterministic.

However, Rajski, in an analogous art, teaches a test generator that generates deterministic test patterns to test circuits under test, including scan chains (column 5, lines 45-66). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to be able to test the can chain using deterministic, since one with ordinary skill in the art would have realized that enabling the invention to test with deterministic test patterns accounts for better fault coverage and enables the device to target random pattern-resistant faults. Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded

Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3).

As per claim 2:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above, further including the steps responsive to consistent results not being identified, of selecting another test pattern; and repeating the testing steps a selected number of times (page 199).

Sarrica does not explicitly teach the generation of the test pattern to be deterministic.

However, Rajski, in an analogous art, teaches a test generator that generates deterministic test patterns to test circuits under test, including scan chains (column 5, lines 45-66). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to be able to test the can chain using deterministic, since one with ordinary skill in the art would have realized that enabling the invention to test with deterministic test patterns accounts for better fault coverage and enables the device to target random pattern-resistant faults. Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-

242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3).

As per claim 3:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above.

Sarrica does not explicitly teach the generation of a test pattern wherein the step of generating a deterministic test pattern includes the steps of using a base deterministic test pattern set generated by an Automatic Test Pattern Generation (ATPG) system.

However, Rajski, in an analogous art, teaches the generation of a test pattern wherein the step of generating a deterministic test pattern includes the steps of using a base deterministic test pattern set generated by an Automatic Test Pattern Generation (ATPG) system (column 7, lines 5-30). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to be able to generate the deterministic test patterns using a base deterministic test pattern, since one with ordinary skill in the art would have realized that enabling the invention to test with a base deterministic test patterns accounts for better fault coverage and enables the device to target all undetected faults (column 7, lines 26-31). Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and

deterministic patterns' (column 3). Hence, the method of generating base test patterns falls under the workable range of the invention and it has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

As per claim 4:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above.

Sarrica does not explicitly teach the generation of a test pattern wherein the step of generating a deterministic test pattern includes the steps of using perturbations of one base deterministic test pattern from a base deterministic test pattern set generated by an Automatic Test Pattern Generation (ATPG) system.

However, Rajski, in an analogous art, teaches the generation of a test pattern wherein the step of generating a deterministic test pattern includes the steps of using perturbations of one base deterministic test pattern from a base deterministic test pattern set generated by an Automatic Test Pattern Generation (ATPG) system (Figure 4 # 74, column 7, lines 35-60). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to be able to generate the deterministic test patterns using perturbations of a base deterministic test pattern, since one with ordinary skill in the art would have realized that enabling the invention to test with perturbations of the base deterministic test patterns would allow the invention to generate a variety of test patterns using minimal resources accounting for better fault coverage (column 7, lines 26-31). Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic

test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3). Hence, the method of generating perturbations of base test patterns falls under the workable range of the invention and it has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

As per claim 5:

Sarrica/Rajski substantially teaches the method as rejected in claim 4 above.

Sarrica does not explicitly teach perturbations wherein the step of using perturbations of one base deterministic test pattern includes the steps of applying said one base deterministic test pattern from the base deterministic test pattern set to an exclusive OR and multiplexing a selected perturbation matrix entry using said exclusive OR.

However, Rajski, in an analogous art, teaches perturbations wherein the step of using perturbations of one base deterministic test pattern includes the steps of applying said one base deterministic test pattern from the base deterministic test pattern set to an exclusive OR and multiplexing (Figure 6 # 84) a selected perturbation matrix entry using said exclusive OR (Figure 4 # 78, column 7, lines 35-60). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to create perturbations exclusive OR and multiplexing since

one with ordinary skill in the art would have realized that enabling the invention to test with perturbations of the base deterministic test patterns would allow the invention to generate a variety of test patterns using minimal resources accounting for better fault coverage (column 7, lines 26-31). Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3). Hence, the method of generating perturbations of base test patterns falls under the workable range of the invention and it has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

As per claim 6:

Sarrica/Rajski substantially teaches the method as rejected in claim 5 above.

Sarrica does not explicitly teach perturbations, including the steps of providing a perturbation matrix with a plurality of perturbation matrix entries including selected ones of no invert, all invert, a predefined bit invert; rotate, and invert rotate.

However, Rajski, in an analogous art, teaches including the steps of providing a perturbation matrix with a plurality of perturbation matrix entries including selected ones of no invert, all invert, a predefined bit invert; rotate, and invert rotate (columns 7-8, lines 64-11). Therefore it would have been obvious to one of ordinary skill in the art at the

time the invention was made to allow Sarrica's invention to create perturbations including selected inversions since one with ordinary skill in the art would have realized that enabling the invention to selectively invert would prevent the application of illegal states which could damage the circuit (column 7, lines 64-66). Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3). Hence, the method of generating perturbations of base test patterns falls under the workable range of the invention and it has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

As per claim 7:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above, wherein the step of generating a test pattern includes the steps of using software Pseudo Random Pattern Generator (PRPG) (Figure 4, page 199).

Sarrica does not explicitly teach the generation of the test pattern to be deterministic.

However, Rajski, in an analogous art, teaches a test generator that generates deterministic test patterns to test circuits under test, including scan chains (column 5, lines 45-66). Therefore it would have been obvious to one of ordinary skill in the art at

the time the invention was made to allow Sarrica's invention to be able to test the can chain using deterministic, since one with ordinary skill in the art would have realized that enabling the invention to test with deterministic test patterns accounts for better fault coverage and enables the device to target random pattern-resistant faults. Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3).

As per claim 8:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above. Sarrica does not explicitly teach the generation of the test pattern to be deterministic.

Sarrica does not explicitly teach the use of a set deterministic test pattern resident in memory.

However, Rajski, in an analogous art teaches the step of generating a deterministic test pattern including the steps of using a set of deterministic test patterns resident in a memory (Figure 4 # 70, column 7, lines 35-60). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to be able to generate patterns from memory, since one with ordinary skill in the art would have realized that enabling the invention to use patterns resident in the memory would allow for an efficient use of resources. Further it should

be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3).

As per claim 9:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above, wherein the step of loading the test pattern into each scan chain in the device under test using lateral insertion via system data ports and applying system clocks includes the steps of applying values of the test pattern to selected one of scan chain inputs and primary inputs (Sarrica, page 198).

Sarrica does not explicitly teach the generation of the test pattern to be deterministic.

However, Rajski, in an analogous art, teaches a test generator that generates deterministic test patterns to test circuits under test, including scan chains (column 5, lines 45-66). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to be able to test the can chain using deterministic, since one with ordinary skill in the art would have realized that enabling the invention to test with deterministic test patterns accounts for better fault coverage and enables the device to target random pattern-resistant faults. Further it should be noted that the combination of a pseudo random generator with an ATPG

(generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3).

As per claim 10:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above, wherein the step of loading the deterministic test pattern into each scan chain in the device under test using lateral insertion via system data ports and applying system clocks includes the steps of applying values of the test pattern to selected one of scan chain inputs and primary inputs (Sarrica, page 198).

Sarrica does not explicitly teach the generation of a test pattern wherein the step of generating a deterministic test pattern includes the steps of using perturbations of one base deterministic test pattern from a base deterministic test pattern set generated by an Automatic Test Pattern Generation (ATPG) system.

However, Rajski, in an analogous art, teaches the generation of a test pattern wherein the step of generating a deterministic test pattern includes the steps of using perturbations of one base deterministic test pattern from a base deterministic test pattern set generated by an Automatic Test Pattern Generation (ATPG) system (Figure 4 # 74, column 7, lines 35-60). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to be able to generate the deterministic test patterns using perturbations of a base deterministic

test pattern, since one with ordinary skill in the art would have realized that enabling the invention to test with perturbations of the base deterministic test patterns would allow the invention to generate a variety of test patterns using minimal resources accounting for better fault coverage (column 7, lines 26-31). Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3). Hence, the method of generating perturbations of base test patterns falls under the workable range of the invention and it has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

As per claim 11:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above, wherein the step of loading the test pattern into each scan chain in the device under test using lateral insertion via system data ports and applying system clocks includes the steps of applying random data from a software Pseudo Random Pattern Generator (PRPG) to scan chain inputs and primary inputs (Figure 4, page 199).

Sarrica does not explicitly teach the generation of the test pattern to be deterministic.

However, Rajski, in an analogous art, teaches a test generator that generates deterministic test patterns to test circuits under test, including scan chains (column 5, lines 45-66). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to be able to test the can chain using deterministic, since one with ordinary skill in the art would have realized that enabling the invention to test with deterministic test patterns accounts for better fault coverage and enables the device to target random pattern-resistant faults. Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3).

As per claim 12:

Sarrica/Rajski substantially teaches the method as rejected in claim 1 above wherein the step of loading the deterministic test pattern into each scan chain in the device under test using lateral insertion via system data ports and applying system clocks (Sarrica, page 198).

Sarrica does not explicitly teach perturbations wherein the step of using perturbations of one base deterministic test pattern includes the steps of applying said one base deterministic test pattern from the base deterministic test pattern set to an

exclusive OR and multiplexing a selected perturbation matrix entry using said exclusive OR.

However, Rajski, in an analogous art, teaches perturbations wherein the step of using perturbations of one base deterministic test pattern includes the steps of applying said one base deterministic test pattern from the base deterministic test pattern set to an exclusive OR and multiplexing (Figure 6 # 84) a selected perturbation matrix entry using said exclusive OR (Figure 4 # 78, column 7, lines 35-60). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow Sarrica's invention to create perturbations exclusive OR and multiplexing since one with ordinary skill in the art would have realized that enabling the invention to test with perturbations of the base deterministic test patterns would allow the invention to generate a variety of test patterns using minimal resources accounting for better fault coverage (column 7, lines 26-31). Further it should be noted that the combination of a pseudo random generator with an ATPG (generator of deterministic test patterns) was well-known in the art, at and before the time the invention was made, and was presented in the 'B. Chinaman in "LFSR-Coded Test Patterns for Scan Designs," Proceedings of European Test Conference, pp.237-242, 1991, this approach combines the benefit of pseudorandom and deterministic patterns' (column 3). Hence, the method of generating perturbations of base test patterns falls under the workable range of the invention and it has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

As per claims 13-18:

Claims 13-18 are directed to an apparatus of the method for implementing deterministic testing of Claims 1-12. Sarrica, and Rajski teach, either alone or in combination as stated above, the method for implementing deterministic testing as set forth in Claims 1-12. Therefore, Sarrica and Rajski also teach, either alone or in combination as stated above, an apparatus as set forth in Claims 13-18.

As per claims 19-20:

Claims 19-20 are directed to a computer program of the method for implementing deterministic testing of Claims 1-12. Sarrica, and Rajski teach, either alone or in combination as stated above, the method for implementing deterministic testing as set forth in Claims 1-12. Therefore, Sarrica and Rajski also teach, either alone or in combination as stated above, a computer program as set forth in Claims 19-20.

Related Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Additional pertinent prior arts, US PG-Pub no. (20040003329 A1) and US Pat no. (6993694 B1, 6950974 B1, 6807646 B1, 6618826 B1, 6385750 B1, 5951703 A) mention the same deterministic test method for scan chains are included herein for Applicant's review.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Saqib J. Siddiqui whose telephone number is (571) 272-6553. The examiner can normally be reached on 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Examiner's Note: Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant, in preparing the responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SS

Saqib Siddiqui
Art Unit 2138
04/21/2006

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